Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the	)	
Commission's Rules to Permit	)	WT Docket No. 11-69
Terrestrial Trunked Radio (TETRA)	)	
Technology	)	
	)	
Request by the TETRA Association for	)	
Waiver of Section 90.209, 90.210, and	)	ET Docket No. 09-234
2.1043 of the Commission's Rules	)	

COMMENTS OF MOTOROLA SOLUTIONS, INC.

Chuck Powers
Director,
Engineering and Technology Policy
Motorola Solutions, Inc.
1455 Pennsylvania Avenue, N.W.
Washington, DC 20004
(202) 371-6900

June 27, 2011

Table of Contents

Summary i

I. Introduction and Summary. 1

II. Interference Issues Raised by the Commission's Proposals. 3

A. Adjacent Channel Interference. 5
B. Emissions Mask. 9
C. 800 MHz Public Safety NPSPAC Channels. 11
D. High Site/Low Site Compatibility. 13

III. Coordination Issues Raised by the Commission's Proposals. 14

IV. Interoperability Issues Raised by the Commission's Proposals. 16

V. Conclusion. 18

SUMMARY

The Federal Communications Commission ("Commission") has issued a Notice of Proposed Rule Making concerning the use of Terrestrial Trunked Radio ("TETRA") technology on certain Part 90 land mobile radio frequencies. The Commission's *Notice* seeks comment on proposed technical rules that would enable digital technologies like TETRA to operate without causing interference to existing systems. The *Notice* also seeks comment on how the deployment of TETRA technology may affect public safety interoperability. The proposals contained in the *Notice* apply to channels available under Part 90 of the Commission's rules in the: 1) 406-512 MHz band; 2) the 806-809/851-854 MHz band that is commonly referred to as the National Plan frequencies or "NPSPAC" public safety channels; 3) the 809-824/854-869 MHz band; and 4) the 929-930 MHz band.

In general, the Commission's proposed revisions to its rules present coordination challenges and interoperability issues for users. These issues could be particularly disruptive to public safety users and, at a minimum, warrant the exclusion of the 800 MHz public safety NPSPAC channels from the applicability of any new rules adopted in this proceeding. The differing technical and operational standards applicable to the NPSPAC channels raise unique issues when considering whether to allow TETRA and similar digital technologies on Part 90 frequencies.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the	)	
Commission's Rules to Permit	)	WT Docket No. 11-69
Terrestrial Trunked Radio (TETRA)	)	
Technology	)	
	)	
Request by the TETRA Association for	)	
Waiver of Section 90.209, 90.210, and	)	ET Docket No. 09-234
2.1043 of the Commission's Rules	)	

COMMENTS OF MOTOROLA SOLUTIONS, INC.

Motorola Solutions, Inc. ("MSI") hereby provides these comments to the Notice of Proposed Rule Making in the above captioned proceedings concerning the use of Terrestrial Trunked Radio ("TETRA") technology on certain Part 90 land mobile radio frequencies.[1]

I. Introduction and Summary.

On November 9, 2009, the TETRA Association requested a waiver of Sections 90.209, 90.210 and 2.1043 to enable TETRA products and devices to receive equipment certification despite non-compliance with the applicable Part 90 emissions and bandwidth requirements. On April 18, 2011, the Commission granted the waiver in part and, at the same time, issued a notice of proposed rule making to consider the adoption of permanent

[1] Amendment of Part 90 of the Commission's Rules to Permit Terrestrial Trunked Radio (TETRA) Technology and Request by the TETRA Association for Waiver of Section 90.209, 90.210, and 2.1043 of the Commission's Rules, *Notice of Proposed Rule Making and Order*, WT Docket No. 11-69, ET Docket No. 09-234, 76 FR 27296 ("*Notice"* or "*TETRA Waiver Order"*).

rules that would enable the broader deployment of TETRA than that permitted under the waiver issued to TETRA manufacturers and licensees.[2]

In general, the *Notice* seeks comment on "proposed technical rules that would enable digital technologies like TETRA to operate without causing interference to existing systems."[3] The *Notice* also seeks comment on "how the deployment of TETRA technology may affect public safety interoperability."[4] The *Notice* contains proposed rule revisions to Section 90.209 and Section 90.210 that would permit the authorization of transmitters designed to operate with up to 22 kHz authorized bandwidths on channels in the: 1) 406-512 MHz band; 2) the 806-809/851-854 MHz band that is commonly referred to as the National Plan frequencies or "NPSPAC" public safety channels; 3) the 809-824/854-869 MHz band; and 4) the 929-930 MHz band.[5]

In these comments, MSI will discuss the impact of modifying the Part 90 technical standards as proposed in the *Notice* to allow the routine authorization of TETRA and other similar technologies in the majority of the Part 90 bands available for land mobile radio. In general, the proposed revisions will present coordination challenges and interoperability issues for users. These issues could be particularly disruptive to public safety users and, at a minimum, warrant the exclusion of the 800 MHz public safety NPSPAC channels from the applicability of any new rules adopted in

---

2 *Id.*

3 *Notice* at ¶ 8.

4 *Id.*

5 *Notice* at Appendix A. While the *Notice* proposes to revise Section 90.209 to allow devices in the 929-930 MHz band to operate with up to 22 kHz authorized bandwidth, the *Notice* does not propose any corresponding amendments in Section 90.210 that would allow devices designed to operate in that band to meet the newly proposed out-of-band emissions specifications for such wideband equipment.

this proceeding.[6] The NPSPAC channels operate under a specific combination of more stringent technical requirements to enable "modified 25 kHz" equipment on 12.5 kHz channel centers with geographic separation between adjacent channel systems.[7] The technical and operational standards applicable to the NPSPAC channels raise unique issues when considering whether to allow TETRA and similar digital technologies on Part 90 frequencies.

II. Interference Issues Raised by the Commission's Proposals.

Section 90.210 of the Commission's rules limits the authorized bandwidth of transmitting devices designed to operate on frequencies/channels available under Part 90. The limits on authorized bandwidth are dictated by the maximum channel bandwidth that is allowed in specific bands. In those bands where 25 kHz wide channels are available, authorized bandwidth is typically limited to a maximum of 20 kHz.[8] TETRA is a technology designed to operate within 25 kHz channels but TETRA devices typically require an authorized bandwidth of 22 kHz. In order to accommodate TETRA deployment in the UHF and 800 MHz bands, the *Notice* proposes to add a new footnote to Section 90.210 to allow technologies designed to operate within 25 kHz channels to be

---

[6] The 800 MHz band reconfiguration will ultimately result in the nationwide realignment of the National Plan NPSPAC channels from 821-824/866-869 MHz to 806-809/851-854 MHz. The issues and impact described in these comments apply to both allocations.

[7] *See* 47 C.F.R. § 90.16. *See also,* Development and Implementation of a Public Safety National Plan and Amendment of Part 90 to Establish Service Rules and Technical Standards for Use of the 821-824/866-869 MHz Bands by the Public Safety Services, *Report and Order,* Gen. Docket 87-112, 3 FCC Rcd 905 (1987).

[8] By definition, authorized bandwidth is the frequency range upon which a total of 99 percent of the radiated power. 47 C.F.R. § 90.7. Typically, authorized bandwidth is less than the applicable channel bandwidth in order to limit the amount of energy that falls into adjacent channels that can be used by other users/systems.

authorized with up to 22 kHz authorized bandwidth, provided that the equipment meets the newly proposed out-of-band emissions ("OOBE") specifications in new Section 90.221 of the rules. Those proposed alternative OOBE limits are based on the adjacent channel power limits specified in the TETRA standard.

The *Notice* seeks comment on the "interference potential" that would result from this combination of rule proposals. In discussing the issue, however, the *Notice* cites to a technical analysis based on TIA Bulletin TSB-88 recommendations that was submitted by the TETRA Association as evidence that "TETRA has a lower interference potential to adjacent channel users than currently used analog FM and Project 25 Phase I transmitters."[9] The *Notice* states that "the [TETRA] Association demonstrates that the emissions profile from TETRA devices is more stringent than the emission mask requirements of Section 90.210 for emissions in the adjacent bands."[10] Based on this analysis, the *Notice* proposes to allow equipment designed to operate within a 25 kHz channel bandwidth (such as TETRA devices) to comply with the ACP limits in the TETRA standard as an alternative to the emission limits of Section 90.210.[11]

The frequency bands under consideration are highly populated with existing systems and introducing wideband 25 kHz technologies into this environment where most users are reducing authorized bandwidths requires careful planning and coordination. The congested nature of these bands means that the interference considerations are complex and multi-dimensional and must be fully assessed prior to full

---

9 *Id.* at ¶ 9.

10 *Id.* at ¶ 10.

11 As drafted, the alternative out-of-band emissions limits in proposed Section 90.221 would be available to all transmitters designed to operate within 25 kHz channel bandwidths in the relevant frequency bands.

deployment of TETRA in order to reduce the possibility of wide-scale disruption to existing users. MSI believes that the interference issues are more complicated than the discussions in the *Notice* and therefore provides the following information to help inform decision-making.

A. Adjacent Channel Interference.

Much of the Commission's support for allowing TETRA on Part 90 frequencies is based on its assumption that TETRA is more benign to adjacent channel users than existing technologies already authorized in the band. This assumption appears to be based primarily on the TSB-88 analysis submitted by the TETRA Association.[12]

The TSB-88 methodology is a useful method for determining the interference potential between specific technologies for purposes of frequency coordination decisions when applied correctly to the specific center frequencies and frequency offsets allowed by the relevant band plan. The TETRA Association, however, submitted an inaccurate TSB-88 analysis comparing the adjacent channel coupled power ratio (ACCPR) of a TETRA signal versus typical victim receivers at various offset spacing.[13] Specifically, the TETRA Association's analysis shows an ACCPR of 68.2 dB for TETRA on "two aggregated 12.5 kHz channels" versus a typical narrowband analog FM receiver at 18.75 kHz spacing.[14] As articulated in the *Notice*, the Commission's existing rules restricts transmitters with an authorized bandwidth exceeding 11.25 kHz to the original 25 kHz

---

12 *Notice* at ¶ 9.

13 Request for Waiver of Sections 90.209, 90.210 AND 2.1043, TETRA Association, WT Docket No. 09-234 (filed Nov. 20, 2009) at Attachment A.

14 *Id.* at page 3, Attachment A.

channels centers in the shared UHF band.[15] With TETRA centered in a 25 kHz channel, the spacing to the first adjacent 12.5 kHz bandwidth channels is 12.5 kHz (*see* Figure 1). Using the same TSB-88 analysis, the ACCPR between TETRA and a typical narrowband analog FM receiver at 12.5 kHz spacing is very high at 13.0 dB – a level that would introduce more potential interference and dictate the need for more adjacent channel coordination than what is considered in the *Notice*.

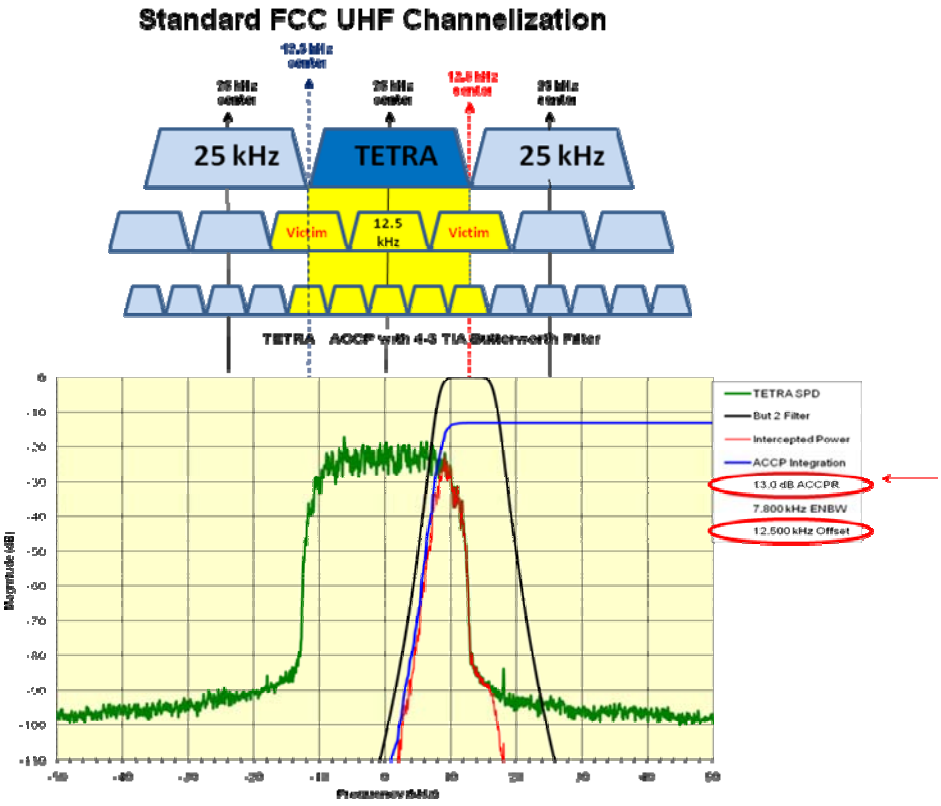


Figure 1

Similarly, the TETRA Association shows ACCPR between TETRA and a 4L-FSK 6.25 kHz receiver at 15.625 kHz. In UHF band, 6.25 kHz bandwidth technologies

[15] See Notice at n. 59 ("We disagree with the suggestion that TETRA equipment be required or permitted to utilize two adjacent 12.5 kHz channels instead of one 25 kHz channel. This would not be compatible with the frequency tables in Part 90 of the rules, which only permit frequency assignments for authorized bandwidths exceeding 11.25 kHz on 25 kHz channel centers. See 47 C.F.R. §§ 90.20(d)(27), 90.35(c)(30").

would normally be spaced 6.25, 12.5, or 18.75 kHz from a 25 kHz channel center, not 15.625 kHz. Since TETRA is likely to be treated as trunking technology in the shared UHF band requiring protected channels under Section 90.187, TSB-88 ACCPR analysis would be useful in adjacent channel coordination analysis to affected 12.5 and 6.25 kHz licensees.

The ACCPR table included in the TETRA Association's filing analyzes various currently deployed 25 kHz technologies at 25 kHz spacing. This analysis is applicable to those portions of the 800 MHz band where channels are spaced at 25 kHz, which includes all 800 MHz channels except for the public safety national plan (*i.e.,* "NPSPAC") channels. In this analysis, TETRA has similar interference potential to/from other 25 kHz technologies. Attached are two additional figures (Figures 2 and 3) showing TSB-88 ACCPR for TETRA modulation at various offset spacing. Typical receiver types are shown across the bottom versus their typical range of bandwidths. Note that ACCPR and interference potential are highly dependent upon the bandwidth of the victim receiver. Because of TETRA's wider modulation bandwidth (22 kHz), ACCPR's in the 60 to 70 dB range are not realized until spacing is beyond 15 kHz.

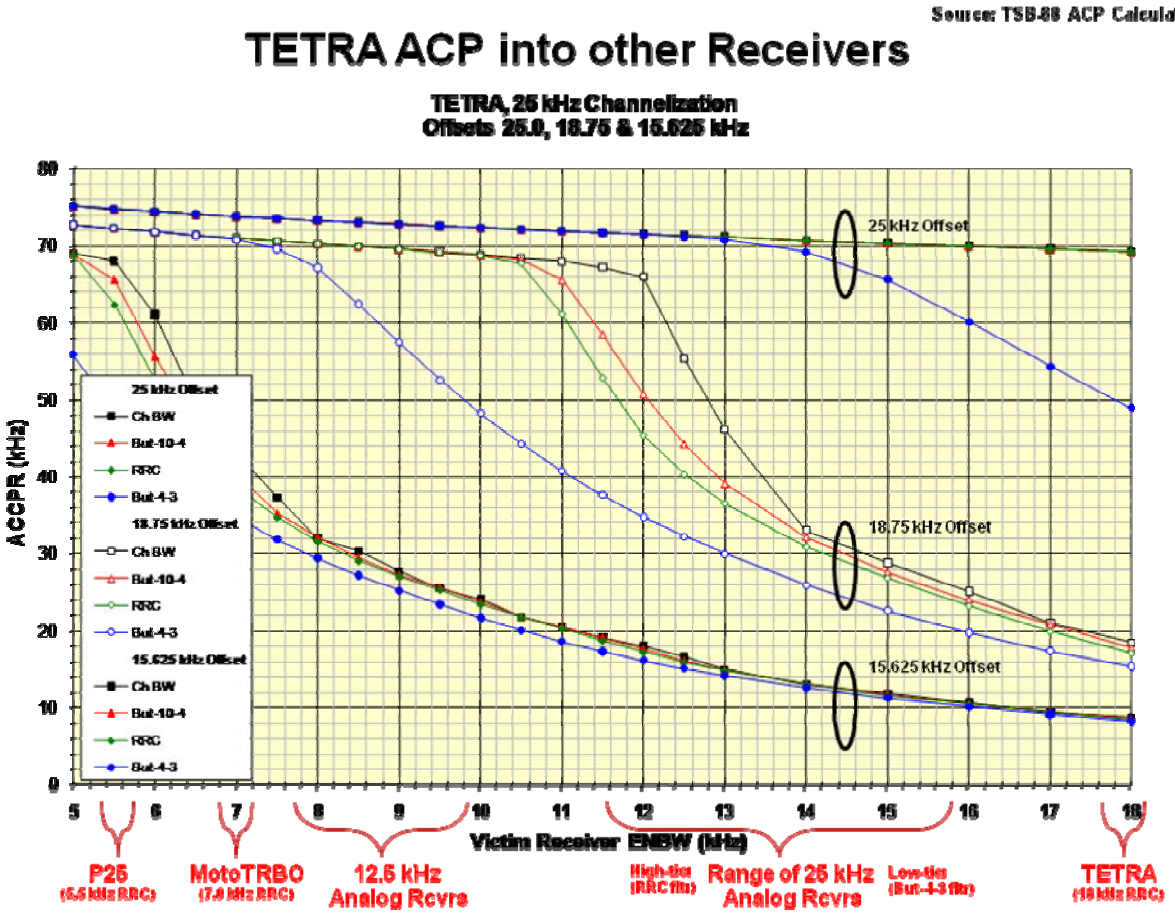

Source: TSB-88 ACP Calculator
TETRA ACP into other Receivers
TETRA, 25 kHz Channelization
Offsets: 25.0, 18.75 & 15.625 kHz
ACCPR (kHz)
25 kHz Offset
18.75 kHz Offset
15.625 kHz Offset
Victim Receiver ENBW (kHz)
P25
(5.5 kHz RRC)
MotoTRBO
(7.6 kHz RRC)
12.5 kHz
Analog Rcvrs
High-tic
(RRC filt)
Range of 25 kHz
Analog Rcvrs
Low-tic
(But.-4-3 filt)
TETRA
(18 kHz RRC)

Figure 2

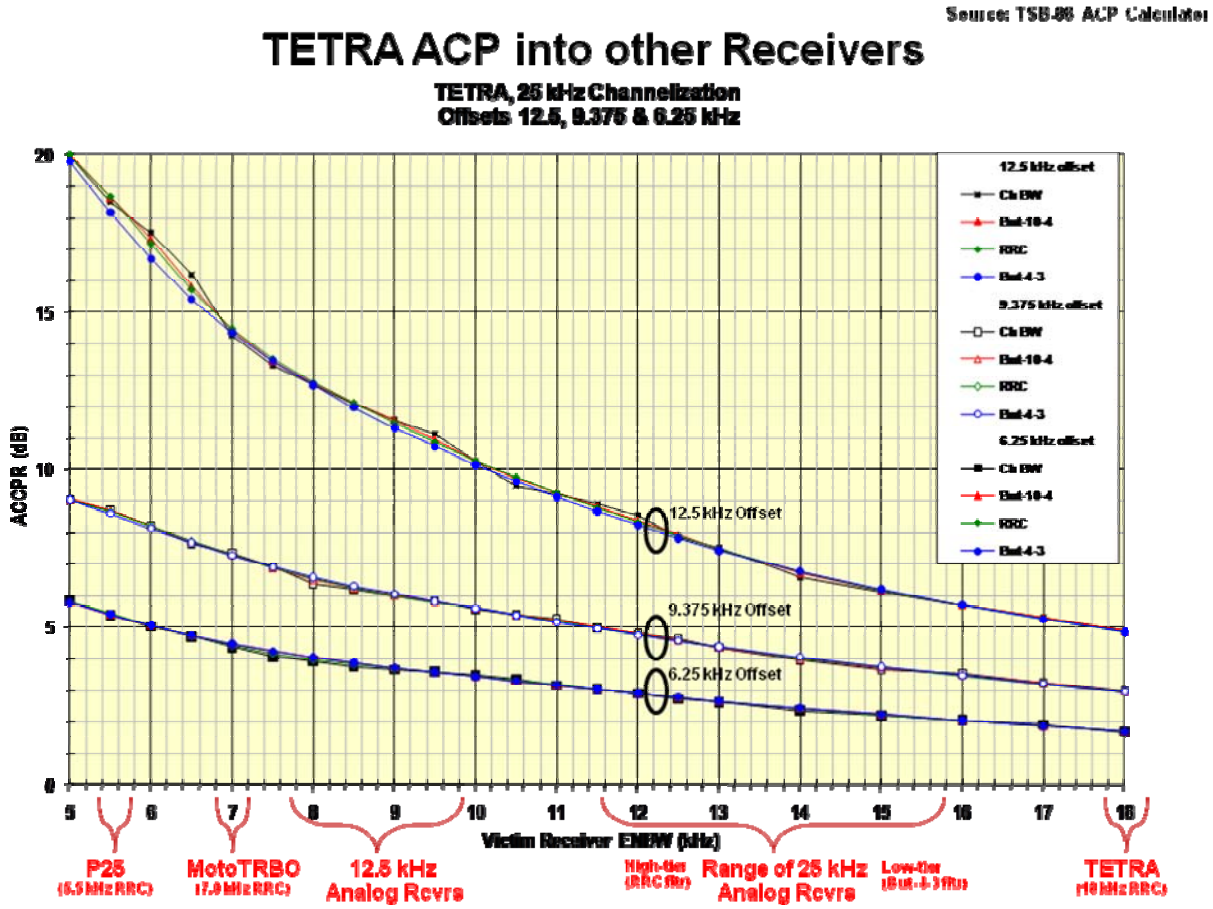


Figure 3

This analysis suggests that significant mileage separations would be needed in bands where TETRA would be deployed on channels having adjacent channel operations within 7.5 kHz or 12.5 kHz, such as the VHF/UHF bands and the 800 MHz NPSPAC channels.

B. Emissions Mask.

The *Notice* proposes to revise Section 90.210 to allow transmitters that operate in excess of 20 kHz authorized bandwidths to meet the TETRA ACP limits (proposed to be codified in new Section 90.221) in lieu of the Commission's existing emissions masks. Designed to be technology neutral, this policy would apply to any digital technology with a bandwidth greater than 20 kHz.

The TETRA standard (ETSI EN 300 392-2) defines measurement of emission limits based upon the use of a TETRA filter that is basically a companion TETRA receiver with bandwidth narrower than the channel. This is using the power coupled into a specific receiver filter at specific spacing to define transmitter emission limits. This approach is better suited for a homogeneous band consisting solely of TETRA equipment. In a mixed band implementing various technologies, transmitter emission limits are more commonly based upon a generic measurement bandwidth that applies across the entire channel bandwidth.

The TETRA standard also defines two different ranges for transmitter emissions. The clause 6.4.2.2 defines narrowband unwanted emissions close to the carrier (*i.e,* essentially the adjacent channel) whereas clause 6.4.2.3 defines discrete spurious emission limits and wideband unwanted emissions that are more than 100 kHz from the carrier, particularly within the transmit band and into the paired receive band. The Commission has proposed to include the TETRA limits of clause 6.4.2.2 into the emission limits of proposed rule Section 90.221 for digital emissions greater than 20 kHz bandwidth. To convert to the equivalent of an emission mask, the measurement bandwidth has been converted from the TETRA filter bandwidth to a full 25 kHz channel bandwidth. Also included are the discrete spurious emission limits. The in-band emission limits of clause 6.9.4.3 were not included in proposed rule 90.221.

This approach is at odds with the development of the ACP requirements for the public safety 700 MHz band. Because the 700 MHz band was designed to support multiple digital technologies of varying bandwidths, the 700 MHz transmitter emission limits and measurement methods of 90.543 were formulated so that emissions limits from

the adjacent channel to the paired receive band were fully defined. Although based upon adjacent channel coupled power ("ACCP"), the 25 kHz tables of 90.543 use entire channels for measurement bandwidths, which renders them technology neutral. Additionally, the 700 MHz transmitter ACCP emission limits were defined to minimize in-band noise. The Commission should consider whether this approach is more appropriate for digital wideband transmitters deployed in the UHF and 800 MHz bands than only the TETRA-specific close-in standards proposed in the *Notice.*

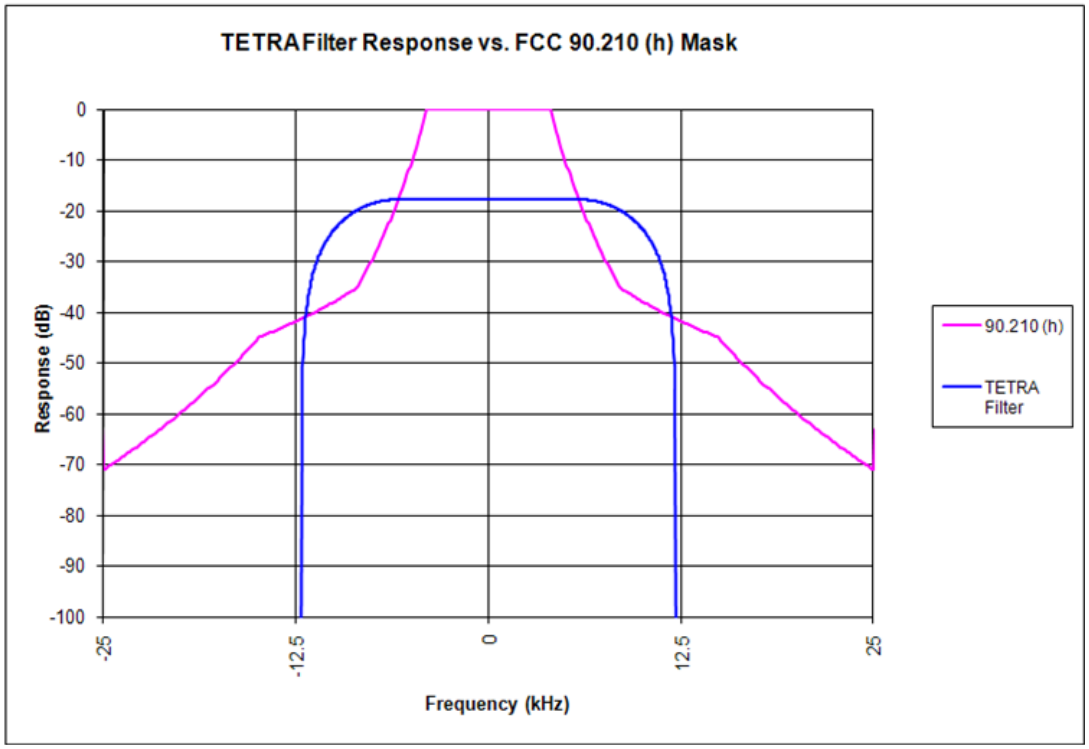
C. 800 MHz Public Safety NPSPAC Channels.

The reduced protection values for adjacent systems spaced within 12.5 kHz as shown above are particularly relevant for the 800 MHz NPSPAC channels at 806-809/851-854 MHz. In order to maximize the efficient use of these channels using the technology then available, the original channeling plan is based on modified 25 kHz wide channels spaced every 12.5 kHz. This interstitial approach requires geographic separation between networks operating on adjacent channels. To minimize the distances required, the FCC imposed more stringent technical standards for operations on these channels, namely reduced deviation of 4 kHz and a more stringent emissions mask, that is singularly applied to the NPSPAC band.[16] The NPSPAC channels are also subject to regional planning to help maximize use of the spectrum while minimizing both adjacent channel and co-channel interference.

The *Notice* does not provide any analysis on the performance of TETRA under the so-called NPSPAC "H mask", most likely because the TETRA Association informed the Commission that "it does not intend to market TETRA equipment to public safety

[16] The applicable mask is codified at Section 90.210(h).

licensees."[17] Despite that disclaimer, the *Notice* proposes rule changes that would permit TETRA in public safety pool frequencies including the NPSPAC channels. The following figure compares the TETRA emission filter with the H-Mask. The variance, approximately 15 dB at some frequencies, is more than the *de minimis* non-compliance considered in the *TETRA Waiver Order.*[18]



Channel assignments in the NPSPAC band are based on a computer model that took the relevant technical standards, *i.e.*, reduced deviation and the tighter H mask, into effect. In areas of the country with high demand, stations have been "shoe-horned" in with little margin. Allowing non-NPSPAC technologies with less adjacent channel

17 *TETRA Waiver Order* at ¶ 21.

18 *Id.* at ¶ 20.

protection will disrupt these assignments and create new coordination and interference resolution issues. Since the regional plans applicable to the NPSPAC channels generally specify required adjacent channel protection, it would appear that any proposed deployments of TETRA or other technologies with the greater 22 kHz bandwidth and less adjacent channel protection would also require modifications to the regional plans.

D. High Site/Low Site Compatibility.

Billions of dollars and several years have been spent rebanding the 800 MHz band. That proceeding highlights the harmful effects of intermingling networks with vastly different architectures. In the *Notice,* the Commission relies on statements from the TETRA Association that the problem is minimized by TETRA networks use of relatively large cell sizes. This is not a design constraint of the technology, however, and TETRA is certainly capable of being deployed across a metropolitan area using hundreds of low elevation base sites. It is therefore appropriate for the Commission to consider additional prophylactic measures to minimize the potential for such interference.

Wide area networks constructed with an extensive number of low elevation base antenna sites do pose risks to traditional LMR networks operating in the same band. At a minimum, the Commission should consider applying its current definition of "high density cellular system" to restrict the co-mingling of networks based on vastly different architectures. MSI notes, however, that the FCC's current definition is based in part on cell hand-off capability, a feature not typically supported by TETRA networks. A more appropriate restriction will need to be developed to ensure that the incompatibilities between LMR and cellular architectures are not recreated.

III. Coordination Issues Raised by the Commission's Proposals.

The *Notice* does not propose any changes to the frequency coordination requirements when considering authorizing TETRA use in the Part 90 frequency bands. MSI agrees that existing coordination procedures are adequate and should be applied neutrally regardless of technology. MSI believes, however, that those interested in marketing and deploying TETRA technology should provide further details on the relevant coordination and licensing requirements.

For example, MSI believes that TETRA networks would be considered centralized trunking systems and all base frequencies licensed as FB8 service class. If this assumption is incorrect, TETRA proponents should describe the technology's monitoring capabilities that would allow it to coexist on shared channels and licensed as either a decentralized trunking system or a hybrid trunked system on frequencies below 512 MHz. Also, the Commission should clarify that for operations below 512 MHz, the provisions of Section 90.187 apply. That section requires prior coordination with all potentially affected licensees as defined under the Commission's rules, and sets forth the specific provisions for any exceptions to the monitoring rules.

On another matter, in its previously filed Request for Clarification, MSI asked the Commission to confirm that the station identification requirements of Section 90.425 would apply to TETRA devices authorized under waiver authority. The relevant provisions of Section 90.425 require the transmission of the station's call sign in the analog mode or Morse code when operating on frequencies below 512 MHz. The TETRA Association dismissed this request by stating that "TETRA base stations transmit station identifiers as part of their protocol, a fact about which MSI is well aware."

As a leading manufacturer of TETRA technology around the world, MSI is well aware that TETRA base stations transmit station identifiers ***in digital format*** as part of their protocol. To comply with FCC rules applicable to operations below 512 MHz, manufacturers will need to add analog or Morse code functionality to comply with the FCC requirements that the licensee call sign information be transmitted. The costs to provide such features are not trivial. Therefore, MSI urges the Commission to consider whether it would be more efficient to revise this rule to allow the transmission of station identification in the digital mode on shared channels, as has been permitted in other Part 90 frequency bands.

Finally, MSI takes the opportunity to support the position of the Enterprise Wireless Alliance ("EWA") which questions the Commission's decision to waive the frequency coordination requirements for those licensees filing an application to modify the emission designator in order to support TETRA deployment. As discussed above, technology type is a relevant consideration when coordinating adjacent channel operations. Applicants/licensees are required to coordinate when they swap out other technologies and it should be no different for TETRA – the Commission's rules should be technology neutral in this regard. MSI also notes that the TETRA Association is in apparent agreement with EWA as stated in its reply to the request for clarification:

> There is no reason to believe that the FCC's applicable coordination rules would be suspended because TETRA technology is being used, or as a result of the grant of the waiver request, which did not seek a waiver of the frequency coordination rule.

The Commission should therefore confirm that licensees would need to coordinate applications to modify emissions designators in order to deploy TETRA technology.

IV. Interoperability Issues Raised by the Commission's Proposals.

The *Notice* seeks comment on whether use of TETRA technology should be permitted on Public Safety Pool frequencies. Noting that many 800 MHz Public Safety pool licensees are adopting Phase I Project 25 technology, the Commission asks commenters to address how TETRA deployment in the Public Safety Pool would generally affect interoperability and if public safety use is authorized, whether TETRA radios should be required to operate with conventional FM on the NPSPAC mutual aid channels.

Congress, the FCC, NTIA, and the Department of Homeland Security have worked with public safety agencies and the vendor community to improve nationwide interoperability. Since the adoption of the Project 25 standard, progress has been significant. Of the existing 36 shared statewide radio systems supporting state, local and Federal agencies, 27 are Project 25 compliant. Certainly more needs to be done, both in terms of broadband and narrowband interoperability, but public safety cannot afford to take any steps backward. For this reason, it is correct for the FCC to focus on the implications for public safety interoperability for any new digital technology to be introduced into this environment.

The basic incompatibility between the FDMA-based Project 25 ("P25") and TDMA-based TETRA technologies creates significant technical challenges to create an effective digital interoperable solution. One principal issue is the vocoders for P25 and TETRA are incompatible. When the P25 standard was enhanced in Phase 2 to add TDMA, the standard was specifically designed to require backward compatibility in the vocoder to facilitate interoperability with P25 Phase I devices. When considering allowing new digital technologies that require interoperability with P25, the Commission

should consider requiring the use of a compatible vocoder. Without this requirement, the need to decode and recode different digital vocoders has been shown to introduce transmission delay, lost audio quality, and cost.

Analog FM remains the standard mode for operation on mutual aid channels available in a variety of bands that are widely used by public safety. This specifically applies to the NPSPAC mutual aid channels; any device authorized to operate in the 806-809/851-854 MHz band must be capable of operation on the NPSPAC mutual aid channels and must comply with the unique operational and technical standards applicable to those channels.[19] Except for the 700 MHz band, public safety pool channels in other frequency bands that are set aside for mutual aid purposes are similarly restricted to analog transmissions.

Also, mutual aid demands unit-to-unit capability, a function that TETRA handsets do differently with Direct Mode Operations ("DMO"). TETRA unit-to-unit transmissions are done in digital mode only. In contrast, public safety unit-to-unit transmissions on the UHF and 800 MHz bands mutual aid channels are conducted using analog FM mode.[20] In order to support unit-to-unit communications on mutual aid channels, TETRA and other approved digital technologies would have to support analog FM conventional mode, or P25 digital conventional mode. The Commission and the public safety user community must determine whether these features and capabilities are necessary for TETRA devices to be authorized in public safety bands. If so, this would likely require the inclusion of an FM mode and a Project 25, Phase I mode or both in

---

19 47 C.F.R. § 90.203(i).

20 On 700 MHz interoperability channels, the baseline technology is P25 Phase I.

TETRA devices as gateways between P25 and TETRA networks will not support unit-to-unit interoperability.

V. Conclusion.

The introduction of digital technologies into mature frequency bands always results in unintended consequences unless careful planning and coordination are performed. In this case, there are significant concerns that allowing TETRA and other similar digital technologies to deploy alongside narrowband networks may cause significant disruption. While care should be taken to protect all incumbent users, particular attention should be afforded to the 800 MHz NPSPAC channels. The current use of these channels, especially the interoperability requirements and the unique assignment and related interference protection mechanisms, are not conducive to shared use by TETRA, as discussed in these comments.

Respectfully submitted,

/s/ *Chuck Powers*
Chuck Powers
Director,
Engineering and Technology Policy
Motorola Solutions, Inc.
1455 Pennsylvania Avenue, N.W.
Washington, DC 20004
(202) 371-6900

June 27, 2011